

We Claim:

1. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]alkane of formula (I)



(I)

in which

$$1 \leq n \leq 8,$$

$$0 \leq m \leq 2 \text{ for } n = 1 \text{ or } 2,$$

$$0 \leq m \leq 4 \text{ for } 3 \leq n \leq 8,$$

$$1 \leq x \leq 12,$$

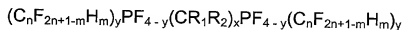
$$0 \leq y \leq 2, \text{ and}$$

where R_1 and R_2 are each independently fluorine, hydrogen, alkyl, fluoroalkyl or perfluoroalkyl,

and each substituent $(\text{C}_n\text{F}_{2n+1-m}\text{H}_m)$ and the number Y of the substituents on phosphorus centers PF_{4-y} are each independently selected,

with the proviso that perfluoro-1,2-bis(diethylidifluorophosphorano)ethane is excluded.

2. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane according to claim 1, wherein $1 \leq n \leq 6$.
3. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane according to claim 1, wherein $1 \leq n \leq 3$.
4. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane according to claim 1 wherein $1 \leq x \leq 8$.
5. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane according to claim 1 wherein $1 \leq x \leq 4$.
6. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane according to claim 1 wherein $m = 0$.
7. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane according claim 1, wherein $y = 2$.
8. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane according to claim 1, wherein R_1 and R_2 are fluorine.
9. A process for the preparation of a fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane of formula (I)



(I)

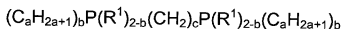
in which $1 \leq n \leq 8$, $0 \leq m \leq 2$ for $n = 1$ or 2 , $0 \leq m \leq 4$ for $3 \leq n \leq 8$,
 $1 \leq x \leq 12$, $0 \leq y \leq 2$, and

where R₁ and R₂ are each independently fluorine, hydrogen, alkyl, fluoroalkyl or perfluoroalkyl, and

and each substituent (C_nF_{2n+1-m}H_m) and the number Y of the substituents on the phosphorus centers PF_{4-Y} are each independently selected,

said process comprising converting at least one α,ω-bis(alkylphosphino)alkane into at least one compound of formula (I) by electrolysis in hydrogen fluoride, and optionally purifying and/or isolating a compound of formula I.

10. The process according to Claim 9, comprising converting at least one compound of formula (II)



(II)

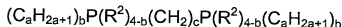
in which R¹ = H, Cl or F,

$$1 \leq a \leq 8,$$

$$b = 0, 1 \text{ or } 2 \text{ and}$$

$$1 \leq c \leq 12,$$

and/or at least one compound of formula (III)



(III)

in which R² = Cl or F,

$$1 \leq a \leq 8,$$

b = 0, 1 or 2 and

$1 \leq c \leq 12$,

and where ligands (C_aH_{2a+1}), and R^1 and R^2 in the compounds (II) and/or (III) are each independently selected,

into a compound of formula (I) by electrolysis in hydrogen fluoride, and optionally purifying and/or isolating a compound of formula (I).

11. The process according to claim 9, wherein electrolysis is carried out at a temperature from -20 to $+40^\circ\text{C}$.

12. The process according to claim 9, wherein electrolysis is carried out at an excess pressure of from 0 to 3 bar above atmospheric pressure.

13. The process according to claim 9, wherein electrolysis is carried out at a voltage of from 4 to 8 volts.

14. The process according to claim 9, wherein electrolysis is carried out at a current density of from 0.2 to 5 A/dm^2 .

15. The process according to claim 9, comprising purifying or isolating a compound of formula (I) by extraction, phase separation, distillation or by a combination thereof.

16. The process according to claim 9 wherein electrolysis is carried out using a positive electrode containing nickel.